

Potential use of Acetylcholinesterase from *Osteochilus hasselti* in Monitoring Heavy Metal Pollution in Malaysia River

Abstract

River pollution gave significant effects by declining the quality of freshwater sources, and cause a negative impact on the aquatic habitat and nearby aquaculture sector. Scheduled river monitoring was implemented to determine and investigate the pollution source in order to minimize the number of waste release into the river. Preliminary screening using biosensor tool considered as an effective method where capable to reduce the cost of implementation, easy to handle as well as rapid analysis. The potential use of acetylcholinesterase (AChE) purified from the brain tissue of *Osteochilus hasselti* as a biosensor tool for heavy metal pollution was investigated. Prior to the study, several water samples were collected from the selected state in Malaysia; Derhaka River (Penang), Perak River (Perak), Kuyuh River (Selangor), Melaka River (Malacca), Peta Waterfall (Endau-Rompin National Park, Johor), followed by filtered then brought to the laboratory immediately. AChE was extracted from the brain tissue of *O. hasselti* followed by affinity purification using procainamide-based chromatography. AChE was tested by incubated separately with the water samples. Based on the semi-quantitative assessment, all the sample from Derhaka River show higher inhibition towards AChE activity compared to the other river. DR01 capable of lowering almost half of the AChE activity to 56.8 ± 2.8 % followed by DR03 (67.96 %) and DR02 (76.74%). Both Melaka river samples; MR1 and MR2 capable to inhibit AChE more than 10% while MR03 around 4 %. Sample from Kuyuh river; KR01, KR02 and KR03 significantly inhibiting the enzyme activity more than 10%. PR (PR01, PR02 and PR03) slightly affecting the AChE activity around 3 to 5 %. However, all the sample from Endau-Rompin National Park considered as unaffected. Secondary screening was done on each river samples using ICP-OEM for quantitative analysis. This can conclude that the inhibition level of AChE corresponds to the concentration of metal ion. From the study proves that *O. hasselti* AChE works as an alternative source of biosensor in monitoring the environmental pollution.